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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,293	04/01/2004	Matthew Donofrio	5308-390	8325
20792 7590 05/14/2007 MYERS BIGEL SIBLEY & SAJOVEC PO BOX 37428 RALEIGH, NC 27627			EXAMINER CHAMBLISS, ALONZO	
			ART UNIT 2814	PAPER NUMBER
			MAIL DATE 05/14/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/815,293

Applicant(s)

DONOFRIO, MATTHEW

Examiner

Alonzo Chambliss

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 19 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,4-6,12,13,17,21,23,25-27 and 46-53 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-6,12,13,17,21,23,25-27 and 46-53 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/13/04 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |                                                                                                            |                                                                                         |
|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

### **DETAILED ACTION**

1. The amendment filed on 2/19/07 has been fully considered and made of record in the instant application.

#### ***Response to Arguments***

2. Applicant's arguments filed 2/19/07 have been fully considered but they are not persuasive.

Applicant alleges that Krames fails to disclose a direct laser ablation technique which a mask material is removed by a laser. This is deemed unpersuasive because Krames teaches a UV radiation to remove the mask layer. It is well known in the semiconductor laser technology that UV radiation is created by a laser to formed patterns as evident by Yang (US2006/0269853) (see paragraph 38) and Traskos et al. (US 4,915,981) (see col. 2 lines 56-65).

Applicant alleges that Krames fails to disclose a micro mask being configured to roughen a surface of the substrate during etching. This is deemed unpersuasive because the thickness of the micro mask aids in the roughen (i.e. etch ratio) of the substrate during etching (see col. 7 lines 35-45).

In regards to plurality of different geometric patterns. It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the different geometric patterns for the triangular shape of Krames, since changing the shape of the structure is an obvious matter of design choice within ordinary skill in the art and it is noted that in the instant specification does not describe different geometric

patterns as **essential or critical** or the **only** shape that could operate the claimed invention.

This action is made **non-final**.

### ***Drawings***

3. The drawings are still objected to under 37 CFR 1.83(a) since the replacement sheet was not filed along with the amendment on 2/19/07. The drawings must show every feature of the invention specified in the claims. Therefore, a micro mask between the mask layer and the substrate that has a thickness must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

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the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 4, 12, 13, and 26 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Krames et al. (US 5,779,924).

With respect to Claim 1, Krames teaches shaping a surface of a semiconductor layer 1 utilizing a laser to define three-dimensional geometric patterns in the layer 1. The shaping of a surface of the semiconductor layer utilizing a laser to define three dimensional geometric patterns in the semiconductor layer comprises: patterning a mask layer 5 (i.e. photo sensitive thin film) on the semiconductor layer 1 using a laser (i.e. UV radiation from a laser) to remove mask material, wherein patterning the mask layer comprises applying laser light to the mask layer at an energy sufficient to remove material from the mask layer. Etching the semiconductor layer 1 using the patterned mask layer 5 to define the three dimensional geometric patterns (col. 6 lines 66 and 67, col. 7 lines 1-67, and col. 8 lines 12-49; Figs. 6, 7a-7c, 8-11, and 13).

With respect to Claim 4, Krames teaches wherein the semiconductor layer comprises the substrate 3 (see Figs. 8-11).

With respect to Claim 12, Krames teaches wherein a plurality of geometric pattern are provided in the surface of the semiconductor layer, wherein the geometric patterns extending into the semiconductor layer and having uninterrupted perimeters at a same level of the semiconductor layer (see Figs. 6, 7a-7c, 8-11, and 13).

With respect to Claims 13 and 26, Krames teaches wherein the surface of the substrate is on a side of the substrate opposite the light-emitting element 20 (i.e. the combination of the plurality of layers). The light-emitting element is on the substrate (see Figs. 13 and 14).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 5, 6, 17, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krames et al. (US 5,779,924) as applied to claim 1 above, and further in view of Suehiro et al. (EP 1263058)

With respect to Claims 5 and 6, Krames discloses the claimed invention except for the substrate comprising a silicon carbide or sapphire. However, Suehiro discloses a substrate comprising a silicon carbide or sapphire for a light-emitting element (see paragraphs 60-64, 68, and 75). Thus, Krames and Suehiro have substantially the same environment of light-emitting element with patterned semiconductor layer. Therefore, one skilled in the art would readily recognize incorporating a sapphire or silicon carbide as a material for the substrate of Krames, since the sapphire or silicon carbide material would provide a reliable material for transmission of light for the light emitting element as taught by Suehiro.

With respect to Claims 17 and 21, Krames discloses the claimed invention except for the plurality of geometric pattern including a plurality of different geometric patterns (i.e. randomization features). However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the different geometric patterns for the triangular shape, since changing the shape of the structure is an obvious matter of design choice within ordinary skill in the art and the difference in shape of the structure does not make the device operating differently. In re Peters, 723 F.2d 891, 221 USPQ 952 (Fed. Cir. 1983). Furthermore, it is noted that in the instant specification does not describe different geometric patterns as essential or critical or the only shape that could operate the claimed invention.

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8. Claims 23, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krames et al. (US 5,779,924) as applied to claim 1 above, and further in view of Jeong et al. (US 6,943,117).

With respect to Claims 23 and 25, Krames discloses the claimed invention except for the mask comprising a polymer mask. The patterning a master template with a laser and embossing the mask layer using the master template. However, Jeong discloses a mask comprising a polymer mask 20 for forming apertures in a layer of material. Patterning a master template 10 with a laser and embossing the mask layer using the master template (see col. 6 lines 55-67 and col. 7 lines 20-30; Figs. 1A-1F). Thus, Krames and Jeong have substantially the same environment of a mask used to form apertures in layer of material. Therefore, one skilled in the art at the time of the invention would readily recognize incorporating a polymer material as the material for the mask of Krames, since the polymer material would facilitate in the desired apertures formed by a laser in the layer of material as taught by Jeong.

With respect to Claims 26 and 27, the combination of Krames and Jeong discloses wherein forming the light-emitting element of Krames (see Figs. 6, 7a-7c, 8-11, and 13) is carried out subsequent to shaping the surface of the substrate in Jeong (see Figs. 1 and 2).

9. Claims 46, 48-52, and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krames et al. (US 5,779,924) in view of Suehiro et al. (EP 1263058) and Watanabe (US2007/0080365).



With respect to Claims 46, Krames discloses patterning a mask layer on a substrate 3 using a laser to remove material from the mask layer 5. Etching the substrate 3 using the patterned mask layer to define the three dimensional geometric patterns (col. 6 lines 66 and 67, col. 7 lines 1-67, and col. 8 lines 12-49; Figs. 6, 7a-7c, 8-11, and 13). Krames fails to explicitly disclose the substrate made of silicon carbide. However, Suehiro discloses a substrate made of silicon carbide (see paragraphs 60-64). Thus, Krames and Suehiro have substantially the same environment of a three dimensional geometric patterns in a semiconductor layer in an optical device. Therefore, one skilled in the art at the time of the invention would readily recognize substitute a silicon carbide substrate for the substrate of Krames, since the silicon carbide substrate provides a stable material for a substrate when creating three dimensional geometric patterns as taught by Suehiro.

With respect to Claim 48, Krames discloses wherein the surface of the substrate is on a side of the substrate opposite the light-emitting element 20 (i.e. the combination of the plurality of layers) (see Figs. 13 and 14).

With respect to Claim 49, it is inherently in the composition characteristic of the mask layer and silicon carbide substrate, that the shape of the pattern of the mask layer is based on a difference between at etch rate of the silicon carbide substrate and an etch rate of the mask layer.

With respect to Claim 50, Krames discloses forming a micro-mask between the mask layer and the silicon carbide substrate of Suehiro. The micro-mask is configured to roughen a surface of the substrate during etching (see col. 7 lines 33-45).

With respect to Claim 51, Krame discloses a micro-mask comprises a metal. It is well known in the semiconductor industry that aluminum is a metal that can be used in a light-emitting device as evident by Watanabe (see paragraph 27).

With respect to Claims 52 and 53, Krames discloses a single etch and in a single patterning of the mask layer to form a three-dimensional geometric shaped (col. 6 lines 66 and 67, col. 7 lines 1-67, and col. 8 lines 12-49; Figs. 6, 7a-7c, 8-11, and 13).

However, Krames fails to disclose the plurality of geometric pattern including a plurality of different geometric patterns (i.e. randomization features). It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the different geometric patterns for the triangular shape, since changing the shape of the structure is an obvious matter of design choice within ordinary skill in the art and the difference in shape of the structure does not make the device operating differently. In re Peters , 723 F.2d 891, 221 USPQ 952 (Fed. Cir. 1983). Furthermore, it is noted that in the instant specification does not describe different geometric patterns as essential or critical or the only shape that could operate the claimed invention.

10. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Krames et al. (US 5,779,924) and Suehiro et al. (EP 1263058) as applied to claim 46 above, and further in view of Boehlen et al. (Laser Micro-machining article).

With respect to Claim 47, Krames-Suehiro discloses the claimed invention except for the mask is a polymer mask. However, Boehlen discloses a mask comprising a polymer mask for forming apertures in a layer of material (see introduction and paragraphs 2.1 and 2.2; Fig. 1). Thus, Krames-Suehiro and Boehlen have substantially

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the same environment of a mask used to form apertures in layer of material. Therefore, one skilled in the art at the time of the invention would readily recognize incorporating a polymer material as the material for the mask of Krames-Suehiro, since the polymer material would facilitate in the desired apertures formed by a laser in the layer of material as taught by Boehlen.

The prior art made of record and not relied upon is cited primarily to show the process of the instant invention.

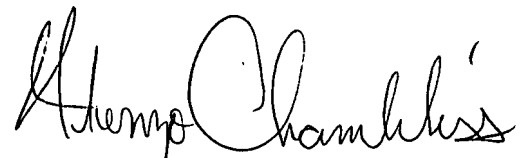
### **Conclusion**

11. Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (571) 272-1927.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system Status information for published applications may be obtained from either Private PMR or Public PMR. Status information for unpublished applications is available through Private PMR only. For more information about the PMR system see <http://pair-dkect.uspto.gov>. Should you have questions on access to the Private PMR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or [EBC\\_Support@uspto.gov](mailto:EBC_Support@uspto.gov).

AC/November 16, 2006

A handwritten signature in black ink, appearing to read "Alonzo Chambliss". The signature is fluid and cursive, with the first name "Alonzo" and last name "Chambliss" clearly distinguishable.

Alonzo Chambliss  
Primary Patent Examiner  
Art Unit 2814